AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Amended) An integrated rotary-linear actuator system, comprising:

a plunger movable along and rotatable about a longitudinal axis extending through the plunger, wherein the plunger is supported against a motor support via bearings;

a coil system having two sets of coils arranged to, when energized, interact with the plunger, the first set of coils being operative to provide an electric field to effect movement of the plunger in a linear mode, the second set of coils being operative to effect movement of the plunger in a rotational mode;

an amplifier coupled to the coils and operative to provide electrical energy to energize the coils; and

a control system integrated with the amplifier, the control system having a network interface operative to receive control information, the control system being operative to control the amplifier to selectively energize the coils to effect desired movement of the plunger based on the control information received via the network interface,

wherein the control system and an associated rotary-linear motor are integrated into a single module.

2. (Previously Amended) The system of claim 1, further comprising an array of magnets arranged on one of an outside surface of the plunger and an inside surface of a the motor support, which supports the plunger to permit movement thereof.

3. (Previously Amended) The system of claim 2, wherein the first set of coils are arranged to apply an axial force on the array of magnets to drive the plunger in the linear mode and a the second set of coils arranged to apply a tangential force on the array of magnets to drive the plunger in the rotational mode.

4. (Original) The system of claim 2, wherein the motor support comprises a bearing support and a housing that define a well operative to receive the plunger, the plunger being supported by a bearing located between the plunger and the bearing support, such that the plunger is axially movable along the longitudinal axis between a retracted position and an extended position and rotatable about the longitudinal axis.

5. (Canceled)

6. (Previously Amended) The system of claim 1, wherein the amplifier further comprises first and second amplifiers, each being operative to provide electrical energy to a respective one of the first and second coils.

7. (Original) The system of claim 1 in combination with a network to which the network interface is coupled, the combination further comprising a computer operative to communicate the control information to the control system *via* the network interface using a network protocol.

8. (Original) The combination of claim 7, wherein the control information includes program data to program operating characteristics of at least part of the integrated rotary-linear actuator system.

9. (Original) The combination of claim 7, wherein the integrated rotary-linear actuator system further comprises at least one sensor operative to sense a condition of the integrated rotary-linear actuator system and provide a sensor signal indicative thereof, the control system being operative to communicate condition data based on the sensor signal to the computer via the network interface using the network protocol.

10. (Original) The combination of claim 9, wherein the control information includes program data operative to program operating characteristics of at least part of the integrated rotary-linear actuator system based on evaluation of the condition data from the integrated rotary-linear actuator system.

11. (Currently Amended) A rotary-linear actuator system, comprising:

a motor support having a well;

a plunger supported for movement via bearings in at least part of the well so as to enable axial movement of the plunger relative to the well along a longitudinal axis of the plunger and rotational movement of the plunger about the longitudinal axis;

an array of permanent magnets associated with the plunger, wherein half of the magnets are oriented such that their north poles point radially outward and the other half such that their north poles point ~~linearly~~ radially inward;

a first set of coils arranged to, when energized, apply an electric field that interacts with the array of magnets and provides an axial force to drive the plunger element in a linear mode;

a second set of coils arranged to, when energized, apply an electric field that interacts with the array of magnets and provides a tangential force to drive the plunger element in a rotational mode; and

an integrated control system having a network interface operative to receive control information via an associated network, the control system being operative to selectively energize the first and second sets of coils to effect movement of the plunger in at least one of the linear and rotational modes,

wherein the integrated control system and an associated rotary-linear motor are integrated into a single module.

12. (Previously Amended) The system of claim 11, further comprising a computer operative to communicate the control information to the control system via the associated network using a network protocol.

13. (Original) The system of claim 12, wherein the control information includes program data having executable instructions to program the control system to effect desired operating characteristics of the rotary-linear actuator system.

14. (Original) The system of claim 12, wherein the rotary-linear actuator system further comprises at least one sensor operative to sense a condition of the rotary-linear actuator system and provide a sensor signal indicative thereof, the control system being operative to communicate condition data based on the sensor signal to the computer via the associated network using the network protocol.

15. (Original) The system of claim 14, wherein the control information includes program data to program operating characteristics of at least part of the integrated rotary-linear actuator system based on evaluation of the condition data from the integrated rotary-linear actuator system.

16. (Previously Amended) An integrated rotary-linear actuator system, comprising:

means for supporting a plurality of motors including means for supporting a bearing, the means for supporting the plurality of motors and the means for supporting the bearing defining a well;

means for moving a stage and adapted to be received by the well, the means for moving the stage being axially movable along its longitudinal axis between retracted and extended conditions and rotatable about its longitudinal axis, the means for moving the stage being supported by a bearing located between the means for moving the stage and the means for supporting the bearing;

means for providing a magnetic field arranged on the means for moving the stage;

means for applying a substantially axial force on the means for providing the magnetic field and driving the means for moving the stage linearly;

means for applying a substantially tangential force on the means for providing the magnetic field for the means for moving the stage rotationally;

means for amplifying an electrical signal and providing the amplified signal to at least one of the means for applying; and

control means for controlling the means for amplifying, the control means including means for interfacing with an associated network and receiving control information to program the control means to control the means for amplifying to selectively activate the means for applying, and transmitting diagnostic information to at least one computer associated with the network,

wherein the control means and an associated motor are integrated into a single module.

17. (Previously Amended) A method for controlling an integrated rotary-linear actuator system, the rotary-linear actuator system including a control system and an associated rotary-linear motor integrated into one module, the control system including a network interface to enable communication over an associated network, the method comprising:

receiving control information at the network interface of the integrated rotary-linear actuator system *via* the associated network;

programming operating parameters of the rotary-linear actuator system based on the received control information; and

controlling an amplifier to selectively energize two sets of coils of the rotary-linear actuator system according to the programmed operating parameters, such that a plunger, which is moveable linearly and rotationally about a longitudinal axis thereof, moves in at least one of a linear and rotational direction, the linear direction in response to the energization of a first set of coils, and the rotational direction in response to the energization of a second set of coils.

18. (Original) The method of claim 17, wherein the control information is communicated from a remote computer *via* the network interface using a network protocol.

19. (Currently Amended) The method of claim 17 ~~20~~, wherein the control information includes program data, the operating parameters of the rotary-linear actuator system being programmed based on the program data.

20. (Original) The method of claim 18, further comprising:

sensing at least one condition of the integrated rotary-linear actuator system;

providing a sensor signal indicative of the sensed at least one condition; and

sending condition data from the integrated rotary-linear actuator system to the computer via the network interface using the network protocol, the condition data being based on the sensor signal.

21. (Original) The method of claim 20, wherein the control information includes program data to program the operating parameters of at least part of the integrated rotary-linear actuator system based on evaluation of the condition data sent from the integrated rotary-linear actuator system.

22. (Currently Amended) An integrated rotary-linear actuator system, comprising:

a plunger movable along and rotatable about a longitudinal axis extending through the plunger, wherein the plunger includes an inner and an outer cylindrical portion, both open at one end, with permanent magnets attached to the inner walls of the inner and outer cylindrical portions;

air bearings supporting the plunger against an actuator support stage;

a coil system having coils arranged to, when energized, interact with the magnets attached to the plunger to move the plunger in a rotational mode and/or a linear mode;

an amplifier coupled to the coils to provide electric energy to the coils;

a control system and a network interface integrated into a single module, the control system integrated with ~~an associated~~ a rotary-linear actuator, the ~~having a~~ network interface ~~for~~ receiving and transmitting at least one of control and diagnostic information to an associated network.

23. (Previously Presented) The system of claim 22 further comprising an encoder system for determining the position of the plunger integrated into a single module with the actuator.

24. (Previously Presented) The system of claim 22, further comprising a computer to communicate control information to the control system via the associated network.

25. (Previously Presented) The system of claim 24, wherein the computer retrieves diagnostic information related to the health of the actuator via the associated network.

26. (Previously Presented) The system of claim 24, wherein the computer is connected to a remote computer over the Internet.

27. (Previously Presented) The system of claim 26, wherein the remote computer is operable to send calibration and/or maintenance program data to the actuator system.